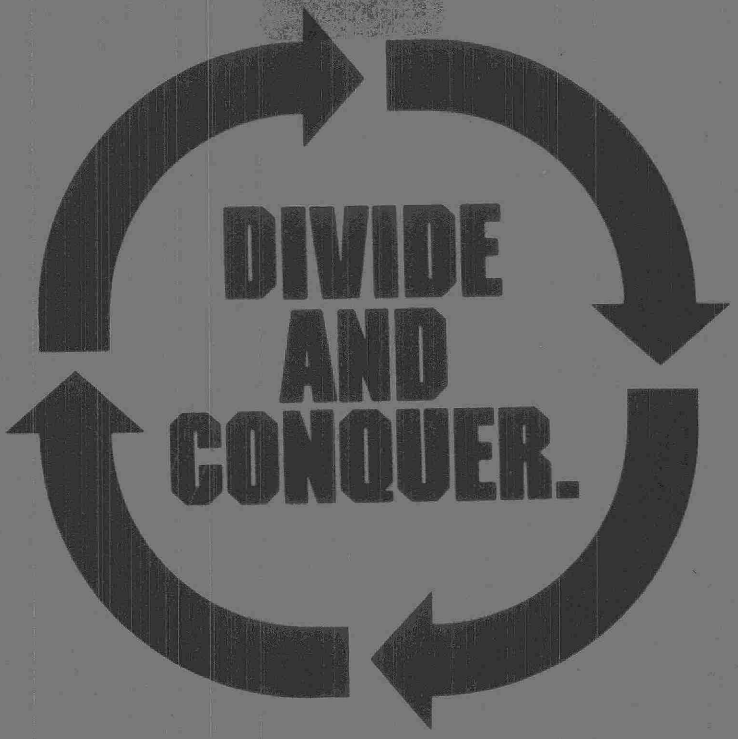
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Guidelines for

School Waste Paper Recovery

March 1980

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KWOC
Paper recovery

Foreword

The Waste Management Branch of the Ontario Ministry of the Environment promotes the initiation of waste management projects which help to reduce the need for waste disposal and which help to lower the demand for natural material and energy resources. As a reflection of its support for such projects, the Branch has prepared this Information Guide for the recovery of waste ledger paper in schools. School waste paper recovery programs allow students to learn, through first-hand experience, valuable lessons in resource management — a skill that will be increasingly important in students' home and eventual career roles.

The Guide is designed to be useful for school administrators, educators, and students wishing to establish a waste paper recovery program on a "do-it-yourself" basis. Although addressed primarily to the secondary school level, the Guide can be adapted to the primary school level. The Guide describes a step-by-step process for keeping used ledger paper separate from general school waste, and arranging transportation of the collected paper to the secondary materials industry for recycling into new paper products.

Research for this publication was conducted in 1979 and early 1980. The Guide has been prepared for the Branch by Resource Integration Systems Ltd. which acknowledges the many school staff and students who contributed the experiences and ideas on which the Guide is based. Copies of this publication may be obtained from the:

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The Value of At-Source Waste Paper Recovery

In most schools, used ledger paper is thrown away as garbage. There is an alternative way of managing school waste. The paper can be kept separate from garbage. This separation activity is called at-source waste recovery. Following recovery, the paper is eventually recycled by industry into new paper products. There are many benefits to at-source recovery and recycling.

When treated as garbage, school paper must be collected by garbage haulers, hauled to disposal sites, and disposed through landfill or incineration. By keeping paper out of the garbage, several kinds of savings result: The financial costs of garbage collection and disposal can be reduced; transportation energy for collecting and hauling garbage can be decreased; and air and water pollution from disposal processes can be reduced.

Paper recycling conserves valuable resources. Waste paper can be substituted for part or all of the raw wood pulp needed in the manufacture of paper products; therefore, recycling reduces the number of trees that must be harvested. Less manufacturing energy is required for making paper products out of waste paper rather than out of raw wood pulp; therefore, recycling conserves energy. Clean air, water, and land are resources too. The recycling process produces less air, water, and land pollution than the process of making paper products out of raw wood pulp.

Recovered paper also has a dollar value on the waste materials market. Although profit should not be the primary reason for starting recovery programs in schools, the revenues received for sold paper can help to cover the costs of recovery programs. Under some circumstances, revenues may exceed costs, resulting in a profit.

Since conservation theory is taught in school, paper recovery programs offer a concrete opportunity to put theory into practice. This combination of theory plus practice is education in the fullest sense. The practice of conservation during school hours would ideally extend to the home where energy and material conservation should also be practiced.

At-source recovery is not limited to school paper. There are programs for the at-source recovery of residential waste newspaper, glass, and cans, in some forty Ontario communities. Waste corrugated cardboard and glass are recovered in many commercial and industrial enterprises. Office paper recovery programs are being established in an increasing number of business and institutional settings, and now exist in several dozen provincial and federal government buildings in Hamilton, Ottawa, and Toronto.

Paper recovery programs already exist in several schools and school board buildings in southern Ontario. A typical high school of 1200 students discards at least three tonnes (3.3 tons) of recoverable paper in a year. The rest of this Guide explains how those three tonnes can become a valuable resource instead of becoming garbage.

Establishing a Recovery Program — Overview

The basic system for recovering waste paper in a school is quite simple. In classroom and staff areas, used ledger paper is deposited into separate containers instead of into waste baskets. These separate containers are periodically emptied, and contents are taken to a central storage area. In the storage area, paper is saved until it is transported to a paper buyer who supplies paper to recycling industries.

Although the system is simple, a successful program needs to be carefully planned and well organized; therefore, ten steps are explained in detail on the following pages of this Guide. It is important to read through the whole Guide before starting any of the steps. These steps are:

Step 1: Recruit a Co-ordinator
Step 2: Estimate the Quantity of Paper Recoverable
Step 3: Establish a Market for the Paper and a Method of Transporting Paper to Market
Step 4: Locate Storage Space for Paper Awaiting Transport
Step 5: Design a Workable Collection System–Choose the Types of Containers and the Collection Method to be Used
Step 6: Develop a Promotional Strategy
Step 7: Calculate Estimated Costs and Revenues
Step 8: Start the Program
Step 9: Operate and Improve the Program
Step 10: Consider Expansion of the Program

Step 1: Recruiting a Co-ordinator

The first step in establishing a recovery program is to recruit a co-ordinator who will take responsibility for the program. The co-ordinator should recruit other persons who will share the work that needs to be done. This core group — the co-ordinator plus helpers — could be called the co-ordinating team.

The responsibilities of the co-ordinator include planning the program (Steps 2-7), putting the program into operation (Step 8), and managing the program on a day-to-day basis (Step 9) with

the option of expanding the program (Step 10). In further sections of this Guide, responsibilities described as those of the co-ordinator can often be delegated to other members of the co-ordinating team.

The co-ordinating team should include one or more staff persons whose presence will: help attract support for the program from other teaching and administrative staff, especially the principal; lend continuity to the program throughout the year, and from year to year; and ensure that advice is readily available for some of the technical work that needs to be carried out. Other members of the team would ideally include students from a cross-section of grades, or at least some students who are not graduating in the first year of the recovery program.

Co-ordinating team members should be committed to the program, and be enthusiastic about the program. They should be reliable, responsible persons with some experience in organizing and promoting projects. Members should have a concern for and/or knowledge of resource conservation issues.

The type of co-ordinating team to be chosen will depend on circumstances at each school. Following are some examples of types of teams which co-ordinate existing school waste paper recovery programs:

- A class, such as an environmental studies, science, or geography class, headed by a teacher. The recovery program is a class project, and marks are sometimes awarded to helpers.
- A special recycling committee, headed by the committee chairperson, and made up of concerned staff and students. Committee members may represent other organizations such as the student council and various clubs. The recovery program is the committee's only project.
- An existing club, such as a science or geography club, headed by a teacher monitor and student officer. The recovery program is a club project.
- A student council recycling subcommittee, headed by a council member and assisted by a teacher monitor. The recovery program is a student council project.

According to recommendations from teachers and students with experience in recovery programs, the four examples are listed in descending order of preference. The second, third, and fourth examples may be appropriate in certain schools, but these types of teams have often shown a tendency for members to lose interest over time; consequently, the class project example is generally recommended as the most reliable approach.

In order to proceed with program planning, the co-ordinating team will need the support of the school principal. If the principal or vice-principal is not a member of the co-ordinating team, then the co-ordinator should meet with the principal in order to: explain the interest in establishing a paper recovery program; describe Steps 2-10; request authorization to carry out the remaining steps; and establish a procedure for communicating with the principal about program progress. Most principals will agree that recovery programs have value, but, as busy administrators, principals need to be assured that recovery programs will not add to their responsibilities or interfere with normal school routines.

Step 2: Estimating the Quantity of Paper Recoverable

As a basis for carrying out the next five planning steps, it is necessary to estimate the amount of high-grade ledger paper to be recovered. To prepare for the estimating procedure, some familiarity with technical terms in the recycling industry is needed. (See Appendix F, Glossary of Terms.)

UNDERSTANDING TECHNICAL TERMS

In the recycling industry, used waste paper is classified according to characteristics which are desired for the various recycling processes and the products to be made. These classifications are called paper "grades." There are dozens of paper grades which are bought and sold in the marketplace, and each grade has a different dollar value.

A "contaminant" is any material which, when mixed with recovered waste paper, reduces the value of the recovered waste paper. Contaminants include "outthrows" and "prohibitive materials." Outthrows are papers which are not acceptable as the grade of paper being recovered. Prohibitive materials are non-paper wastes, such as plastic, glue binding, glass, metal, and so forth, which are not acceptable in the recycling process.

In the high-grade paper recycling process, inks and colours are first washed out of waste high-grade paper which is made of long, strong, chemically pulped, bleached fibres. This cleaning process is called "de-inking." Next, the de-inked fibres are mixed with water, chemicals and bleached wood pulp, into a kind of paper soup. The wet fibre mixture is then sprayed onto screens, rolled into new paper, and dried with hot air. This very simplified description of the recycling process helps to explain why contamination must be avoided at the recovery stage:

- Waste material that is added to the process must be water soluble — it must be able to dissolve in water. All insoluble materials, such as glass, metal, plastic, and carbon "paper," as well as slick or glossy paper which is coated (e.g. magazines), are prohibited.
- A special type of insoluble material, which must be kept out of the process, is "hot melt glue," often found in book bindings. This type of glue and certain plastics create slick areas which do not absorb printing ink on the finished paper, or burn off during the hot drying process, leaving holes in the finished

paper.

- Waste material that is added to the high-grade process must not contain any low-grade paper, such as newspaper, newsprint-type exercise paper, construction paper, boxes, cardboard, kraft envelopes, and paper bags – all found in school waste. Low-grade papers have fibre structures and chemical compositions which make such waste papers unsuitable for high-grade recycling. For example, a low-grade paper called "Kraft" includes the brown/tan/yellow envelopes that are discarded in school office areas, and brown paper lunch bags. Kraft is unbleached material; that is, its "colour" is natural. Such material cannot be de-inked as can other coloured paper which was initially bleached, then tinted, and is able to be washed of its colour through de-inking. Some low-grade paper has groundwood content, the result of mechanical pulping. The presence of very tiny ground wood particles can be seen in newspaper, newsprint-type exercise paper, and some types of boxes. Various low-grade papers, classified into such grades as "News," "Old Corrugated Cardboard," and "Kraft," are recoverable and recyclable, but such papers are considered contaminants if mixed with recovered high-grade papers. (Low-grade papers can usually be identified by their natural tan or grey "colour," and sometimes by the presence of tiny flecks of wood.)

The rule is that only waste high-grade ledger paper can be recycled into new high-grade paper, such as the bond on which this Guide is printed. If recovered high-grade ledger paper contains low-grade outthrows, then it will not, in its present condition, be able to be de-inked and recycled into products such as writing paper and tissue, but rather into products such as boxes and newsprint; consequently, the presence of outthrows usually means that recovered paper will be reclassified by industry as a lower grade than the grade which a school intended to recover. Furthermore, the presence of prohibitive coated papers and non-paper wastes usually means that recovered paper, in its present condition, will be worthless for recycling.

Some specific waste paper grades*, listed in order of decreasing market value, are:

- "White Ledger: Printed white bonds."
- "Manifold Coloured Ledger: Printed white bonds with 10% coloured bonds."
- "Coloured Ledger: Printed coloured bonds (can include varying % of white bonds)."
- "High-Grade Mixed Paper: Clean assortment of various grades (shall not exceed 5% groundwood content)."

In descending order, papers listed in one grade are acceptable in the next lower grade and in all of the other lower grades. In ascending order, papers listed in a lower grade and not listed in the next higher grade, are outthrows in the next higher grade and in all of the other higher grades. For example: printed white bonds are acceptable in all of the grades; printed coloured bonds are acceptable in the last three grades, but more than 10% coloured bonds would be acceptable only in the last two grades; and a small amount of papers with groundwood content is acceptable only in the last grade. If more than 5% groundwood papers are present, then recovered high-grade paper would be down-graded to "Low-Grade Mixed Paper," a grade not included on the above list.

Computer printout and tab cards are acceptable in all of the four high grades listed above, but these very valuable computer papers also have their own grade names as follows, in decreasing order of market value:

- "Manilla Tabs: Regular white computer cards."
- "Coloured Tabs: Regular coloured computer cards."
- "Manifold White Ledger: Computer printout/lightly printed bond."

Further on, in Step 3, a decision will be made, with the advice of a paper buyer, about which grade(s) are to be recovered in the school program. In most school waste paper recovery programs, "Coloured Ledger" is targeted for recovery. "Coloured Ledger" includes all white and coloured high-grade papers.

ESTIMATING THE QUANTITY OF PAPER RECOVERABLE BY RESEARCHING SCHOOL WASTE

The object of this research is to determine the types and quantities of high-grade paper that can be recovered in a school. Authorization from the principal, co-operation from the custodian, and access to a weigh scale will be necessary. There are four parts to the research:

Part A:	Estimate the Total Quantity of Dry Waste Produced
Part B:	Determine the Percent of Various Ledger Papers in the Waste
Part C:	Calculate the Quantity of Ledger Available in the Waste
Part D:	Estimate the Quantity of Ledger Recoverable From the Quantity Available

Part A: Estimating the Total Quantity of Dry Waste Produced

After custodians collect waste in drums or carts, the waste is usually removed from a school in plastic bags; however, in some schools, the waste is disposed into a large bin, a compactor, or an incinerator. Some of this waste is wet waste from cafeteria and washroom areas where recoverable paper is rarely found; therefore, only dry waste from teaching and administrative areas is of interest in this research. Before starting the re-

* Descriptions of grades vary among buyers of paper. These definitions are taken from "Paper Stock Review," Recoup.

search, the co-operation of the custodian must be obtained. The custodian should be asked to collect dry waste separately from wet waste during the research stage – a one week period.

To estimate total dry waste produced per week when bags are used for disposal:

1. Keep a count of approximately how many bags of dry waste are removed from the school in the week.
2. Weigh a number of randomly selected bags of dry waste to establish an average bag weight. (Divide the total weight of the bags weighted by the number of bags weighed, and the result is the weight of an average bag.)
3. Multiply the average bag weight by the number of bags removed in the week. This figure is the estimated weight of dry waste produced in an average week*.

*Example***:

43 bags	– dry waste removed from the school
X 7 kg.	– the average bag weight of 6 bags which weigh 10, 9, 8, 6, 5, and 4 kg. respectively, for a total of 42 kg. divided by 6 = 7 kg. average
301 kg.	– estimated weight of dry waste produced in an average week

The procedure is slightly different for estimating total weekly dry waste if dry waste is not put into bags, but disposed instead into cans, a large bin, a compactor, or an incinerator. 1. A one-week count will need to be kept of approximately how many drumfuls or cartloads of dry waste are collected by the custodian and brought to the disposal area. 2. To determine average drum/cart content weight, a number of randomly selected drums/carts will need to be weighed before they are emptied into the cans/bin/compactor/incinerator. (Be sure to subtract the weight of the drum/cart itself for each container weighed.) 3. The average drum/cart content weight can then be multiplied by the number of drums/carts brought for disposal in the week. This figure is the estimated weight of dry waste produced in an average week.

Example:

15 cartloads	– emptied into a disposal bin
X20 kg.	– the average cartload content weight
300 kg.	– estimated weight of dry waste produced in an average week

Part B: Determining the Percent of Various Ledger Papers in the Waste

1. Obtain a sample of about 25 kg. of dry waste from bags or from custodian carts/drums before they are emptied.
2. Sort***the waste into at least three containers, i.e. large boxes. One box will be for white high-grade paper. The second box will be for coloured high-grade paper. The third box will be for non-paper waste and non-high-grade paper. (See Appendix B for specific examples of these materials.) In some schools with computer equipment, additional boxes may be designated for researching the amount of computer papers in the waste.
3. Weigh each box, subtracting the weight of the box each time one is weighed.
4. Calculate the percent of weight represented by each of the three or more boxfuls relative to the total weight.

Example:

Category	Weight (kg.)	Percent of Total Dry Waste Weighed
white high-grade paper	6	24
coloured high-grade paper	1	4
non-paper waste and non-high-grade paper	18	72
total	25	100

This information about the percents of various ledger papers in the waste will be more accurate if several 25-kg. samples are sorted and weighed, and the results are averaged.

Part C: Calculating the Quantity of Ledger Available in the Waste

Multiply the total waste from Part A by the percents from Part B.

Example:

Category	Percent of Total Dry Waste Weighed in Part B	Estimated Weight of Dry Waste Produced per Week (kg.)	Quantity of Ledger Available for Recovery per Week (kg.)
computer printout	1	301	3
white high-grade paper (excluding computer printout)	23	301	69
coloured high-grade paper	4	301	12
total ledger paper available			84

* The total dry waste produced in certain weeks may be much higher during weeks when exam papers are discarded or lockers are cleaned out. Since this research will likely be carried out early in a school term, the estimate will probably be lower than the total overall dry waste produced per week.

** In order to simplify the examples in this Guide, only whole numbers are generally used. This rounding usually results in some distortions, e.g. proportions may not sum to totals; metric and non-metric measures may not be equivalent to each other when both measures are used in the same example. Certain non-metric measures are used because the recycling industry generally treats quantity in non-metric terms, as do many equipment suppliers.

***This procedure of sorting into several boxes is for the purpose of research only, and will not apply to actual program operation later.

Part D: Estimating the Quantity of Ledger Recoverable from the Quantity Available

Although the calculation in Part C provides an estimate of the quantity of ledger available for recovery from the waste, it is not likely that all persons in the school will participate all of the time; therefore, the estimate from Part C should be scaled down to allow for less than 100% recovery. It is very difficult to predict a rate of recovery before the program is actually in operation. In some schools, where recovery programs are not vigorously promoted, actual ledger recovery is as low as 30% of the quantity available. Further on, in Step 6, the importance of promoting the program will be emphasized, but for present purposes, it should be assumed that the recovery program being planned will be strongly promoted, and that about 80% of available ledger will be recovered.

To complete Step 2, multiply the quantity available for recovery from Part C by a recovery rate, e.g. 80%.

Example:

90 kg.	– available ledger
X80 %	– recovery rate expected
72 kg.	– estimated ledger recoverable per week

ESTIMATING THE QUANTITY OF PAPER RECOVERABLE BY EMPLOYING A STANDARD FIGURE

Conducting research on school waste is the more accurate method of estimating the quantity of paper recoverable in a specific school; however, if it is not possible to carry out such research, then a standard figure may be employed to arrive at an estimate. Based on data from existing programs, average ledger recovery in a high school is estimated to be 14 grams (.03 pound) per student per day. The total upon which this rate is based includes ledger recovered in teaching and administrative staff areas. Extreme caution should be used in applying this standard figure to schools in general, especially primary schools in which less ledger is likely to be available and recoverable due to greater use of newsprint-type exercise paper.

Example: Paper Recoverable in a Secondary School with 1200 Students Enrolled:

1,200	students
X14	grams of ledger recoverable per student per day
= 16,800	grams of ledger per day
+ 1,000	grams per kilogram
= 16.8	kg. recoverable per day
X5	days per week
84	kg. of ledger per week

Step 3: Establishing a Market For the Paper and a Method of Transporting Paper to Market

Locating a purchaser for the paper to be recovered is a step to be taken after estimating the quantity of paper recoverable, but before proceeding with further planning steps. To prepare for marketing and transportation research, some familiarity with paper buyer activity is necessary.

UNDERSTANDING PAPER BUYER ACTIVITY

The three main purchasers of waste paper are dealers, brokers, and mills. School waste paper is usually sold to dealers. A waste paper dealer generally purchases paper, bales* it after sorting it into specific grades, and then re-sells it either to a larger dealer, to a broker, or directly to a mill. A broker buys and sells paper without coming into contact with the paper. The mill is the point at which recycling occurs. Because mills handle large quantities of waste paper, mills usually prefer paper that is correctly graded, free of contaminants, and baled. It would be unusual for school waste paper to be sold to a mill, either directly, or through a broker.

Dealers prefer to do business with suppliers of large quantities of uncontaminated paper. Some dealers provide storage containers and/or collection service for large-quantity suppliers of recovered paper. Collection service is not likely to be provided for small-quantity suppliers because it is not economical for dealers to do so; however, if a small supplier is on a dealer's existing collection route, then the dealer might agree to pick up the paper as long as a minimum of 907 kg. (1 ton**) of paper is available for pick-up. If dealer-provided pick-up is not available, or not desirable from the point of view of storing paper between 907-kg. pick-ups, then the supplier will need to deliver paper to a dealer. In order to discourage small deliveries, some dealers specify a minimum delivery of 227 kg. (500 lbs.**).

In early 1980, the price paid by dealers for loose "Coloured Ledger" was about $88 per tonne ($80 per ton**).This figure is listed as an example only. Exact prices are negotiated be-

* Baling is a mechanical process in which papers are compacted and strapped together into large bundles of, for example, 450 kg. (1000 lbs.) each, for economical storage, handling, and shipping. The cost of a baler would be prohibitively expensive for individual schools which produce relatively small quantities of waste paper.

** The recycling industry generally calculates in non-metric measures.

tween buyer and seller, and depend on paper quality, paper quantity, and dealers' collection costs if the paper is not delivered.

CONTACTING DEALERS

The names of waste paper purchasers can usually be found in the Yellow Pages of the phone directory under "Waste Paper." If a school is located in a more remote area where there are no local paper dealers, then the Yellow Pages for the nearest large municipality can be consulted; however, delivering paper to a distant dealer may be quite expensive. In certain Ontario municipalities, there are community-based recovery program operators who accept school waste paper as well as other wastes recovered in residences, businesses, and institutions. Such operators do not usually pay revenue for material collected, but their location in the community may be the factor that makes a school paper recovery program possible. (See Appendix A for a list of waste ledger paper dealers and brokers active in Ontario, and see Appendix G for information on the referral service provided by the Recycling Council of Ontario.)

When contacting dealers, the co-ordinator will want to know:

- What prices are paid for various ledger papers?
- What effect will various percentages of contamination have on prices paid, and are prices likely to change for other reasons such as general market conditions?
- Can pick-up service be provided; if so, what minimum quantity is necessary for a pick-up, and how will pick-up service affect price paid?
- Can storage containers be provided, e.g. jute bags, bins on wheels?
- If pick-up cannot be provided by the dealer: What is the minimum quantity that can be delivered to the dealer, and what are the hours of operation for deliveries?
- If the dealer is not providing storage containers, or is not providing pick-up service: Are there any special rules about pick-up/delivery containers, i.e. can paper be picked up/delivered in boxes, plastic bags, jute bags? (This information will have a bearing on Steps 4 and 5.)
- What method will be used for weighing and reporting acceptable recovered quantities, and for notifying about rejected (contaminated) quantities?
- What will the terms of payment be, e.g. cash on receipt of paper, payment 30 days after receipt, etc.?

When contacted, dealers will want to know:

- What types of paper will be available?
- What quantity of paper will be recovered, and how frequently will it be available to the buyer?
- If the dealer is considering collecting paper from the school: Is there a loading dock at the school? Is the paper storage space easily accessible from the truck loading area? Will the paper be in reusable jute bags or disposable boxes/bags? Are there any (other) problems that will complicate handling? (This information will not be able to be confirmed until Steps 4 and 5 are completed.)
- How will contamination problems be resolved?

Prices paid and services vary among dealers; therefore, it is advisable to canvass several dealers, if several are locally available, before making a commitment to one dealer. In contacting dealers, it is important to be businesslike and to indicate the intention to plan a good program.

RESEARCHING TRANSPORTATION ARRANGEMENTS

An individual school is not a large-quantity supplier of paper; therefore, dealer-provided pick-up service may not be available, or may be available only for 907-kg. (1-ton) loads, necessitating lengthy storage periods between pick-ups. For example, at the end of Step 2, 84 kg. (185 lbs.) is the estimated quantity of recoverable ledger per week in a school with 1200 students enrolled. It would take almost eleven weeks to accumulate 907 kg. (1 ton) of paper for a dealer-provided pick-up (907 kg. per pick-up ÷ 84 kg. per week = 11 weeks storage between pick-ups). More frequent pick-ups of smaller loads may be available to a school if a dealer also picks up from a nearby large-quantity supplier, but this opportunity would be relatively unusual.

If dealer-provided pick-up is not available, or too infrequently available from the point of view of storage, then some method will need to be found for delivering paper to market. Some options for delivering paper to a buyer include:

- renting a vehicle to be driven by an adult volunteer;
- contracting for commercial cartage which includes truck and driver;
- borrowing a vehicle to be driven by its owner, also a volunteer;
- arranging for the use of a school board vehicle;
- contracting with an independent trucker for back-haul (This option may be possible in areas where there are no local paper buyers. If a trucker delivers to a local business, then the driver may be returning to the point of origin with an empty truck or a partial load, and may be willing to deliver school paper to market at a reduced cartage rate; alternatively, a local business may be sending its own empty truck to haul goods from a distance, and may be willing to deliver school paper to market for a share of the travel expense.).

Delivery options should be examined on the basis of cost and reliability. The commercial

cartage option is likely to be too expensive for small loads, unless a reduced rate can be negotiated from a company. The borrowed vehicle, school board vehicle, and back-haul options may be "free" or reasonably priced, but may lack long-term reliability. The rental option poses a reliability problem since an adult volunteer driver is needed. The cost of the rental option will depend on the quantity of paper delivered. For example, using the 84-kg. (185-lb.) weekly recovery figure, a minimum 227-kg. (500-lb.) delivery could be made once every three weeks in a panel van which can be rented* for approximately $30 per day. Based on $88 per tonne revenue, the loss would be $10 per trip ($30 cost – $20 revenue = $10 net loss). On the other hand, a full three-quarter-ton van load of 680 kg. could be delivered once every eight weeks. The excess of revenue over cost would be $30 per trip ($60 revenue – $30 cost = $30). Further on, in Step 10, the possibility of co-operative transportation arrangements among schools with recovery programs will be examined.

FINALIZING MARKET DECISIONS

Step 3 is nearly complete when the results of the dealer canvass are listed, along with details about the alternatives for delivering paper to market, if dealer-provided transport is not available or frequent enough from the point of view of storage concerns. It is now necessary to evaluate the information gathered, and choose a dealer and a transport method. The choice could be clear-cut, or could require some calculations. For example, one dealer may offer higher prices and no services, whereas another dealer may offer lower prices and some services. Distance to various dealers will be an important consideration for schools which must deliver to market.

When chosen, the dealer should be re-contacted to confirm points covered in the initial canvass. Written confirmation from both supplier and purchaser would be a valuable record of agreements made. The dealer will likely want to see samples of the various papers available in the school waste. In consultation with the dealer, an exact paper grade can be targeted for recovery.

Choice of the grade to be targeted for recovery will depend on the types and quantities of high-grade papers available and recoverable in the school waste (from Step 2, Parts C and D), prices paid for various grades, and convenience factors. In most schools with existing waste paper recovery programs, the "Coloured Ledger" grade is targeted for recovery, instead of the "White Ledger" grade in which no coloured papers are acceptable. In some of these schools, computer printout and tab cards are boxed separately in the computer area and stored separately in order to obtain maximum revenue for these valuable papers; however, in most schools, these more valuable papers are simply combined with other ledger papers in order to eliminate any inconvenience in the collection system (See Step 5.). With a grade targeted for recovery, further planning can be carried out.

Step 4: Locating Storage Space for Paper Awaiting Transport

The amount of storage space needed will depend on the amount of paper to be stored between shipments to market, and the type of storage containers to be used.

The floor area required to store 907 kg. (1 ton, the minimum amount of paper that most dealers will consider picking up) of loose paper in jute bags**is estimated to be 12 square metres (equivalent to a space measuring 3.5 m. X 3.5 m., or 12 ft. X 12 ft.). Using the sample figure of 84 kg. (185 lbs.) recovered per week in a typical high school, paper would need to be stored for eleven-week periods between pick-ups of 1-ton loads. If smaller loads of paper are delivered to market more frequently, then less storage space will be required. Certain types of storage containers take up more space than others. For example, jute bags or boxes can be stacked on top of one another in storage, but large metal drums or wooden bins cannot be stacked.

The ideal storage space would be a room which can be closed or locked to reduce the potential for fire and vandalism. The storage area should be separate from the area where other wastes are stored so that recovered paper is not confused with garbage. The storage area should be central for persons collecting paper from within the building, and should be near the loading dock for shipping purposes. Once an area for waste paper storage has been selected, it is advisable to check with local fire prevention officials about fire safety standards.

Locating storage space can present a challenge for several reasons: the storage period required to accumulate an economical shipping load can be lengthy; school buildings have not been designed for the storage of recovered paper; school administrators are concerned about fire hazards; and local building codes usually specify that combustible materials should be stored in areas equipped with sprinklers and/or fire walls.

Nevertheless, a committed co-ordinator with support from the school principal should be able to meet the challenge of locating storage space. Schools with existing paper recovery programs are storing paper for as long as four months, and

* Price estimate for a three-quarter-ton panel van includes daily rental, kilometrage charge, insurance, sales tax on rental and kilometrage charge, and fuel for a short trip. The weight and volume capacity of a delivery vehicle must be adequate for the quantity of paper transported.

**See Appendix F, Glossary of Terms.

no fire problems are known to have occurred. For some examples, paper is being stored: in an unused rifle range, in an unused freezer locker, in an empty classroom, in a towel laundry room near athletic facilities, in an unused cloak room connected to a basement activity room, in a custodian's large office, and in covered metal drums in a well-sheltered outside area.

If no inside storage space can be located, then consideration could be given to building or purchasing a garden-type shed which can be placed outside of, but very close to the school, and which can be locked to prevent vandalism. Consideration could also be given to converting some available open, inside space into a storage room which meets local fire safety standards.

Step 5:

Designing a Workable Collection System — Choosing the Types of Containers and the Collection Method to be Used

Containers are necessary for holding recovered paper from the point at which paper becomes waste to the point at which paper is transported to market. Persons are needed for moving paper through the same flow — from source to market.

If paper is to be picked up by a dealer, then the dealer will either provide storage/shipping containers, or recommend the type(s) of container(s) to be obtained by the school. The dealer may specify that school persons will be required as helpers for transferring paper from the storage area to the loading dock, if the storage area is not easily accessible to the driver. These persons will need to be recruited by the co-ordinator. On the other hand, if paper is to be delivered to market, then the dealer will not provide labour, but will either provide storage, shipping containers, or recommend the type(s) of container(s) to be obtained by the school for delivering paper. School persons will need to be recruited, not only for transferring stored paper to the loading dock, but also for loading the vehicle, for driving to market, and for off-loading at market. The exact system for moving paper from storage to market should be designed according to circumstances in Steps 2, 3, and 4. Step 5 focuses on internal collection — from source to storage.

CHOOSING TYPES OF CONTAINERS

Containers fall into three categories: those for holding classroom and staff area paper; those for storing and shipping paper; and those for moving paper from classroom and staff areas to storage.

For Holding Classroom and Staff Area Paper
A container for the convenient deposit of paper should be placed in every room where ledger is being generated. A survey of the building will be useful for determining the number of containers needed. Containers should be clearly designated for recovered paper, and will be most effective if a uniform type of container is used throughout the entire building.

Examples of containers include square plastic dish pans, fibre drums, and cardboard boxes. Boxes and fibre drums should be painted/decorated, and plastic pans should be brightly coloured, in order to clearly distinguish recycling containers from containers for other materials, especially garbage. If boxes or pans are employed, they should be set on a ledge/table/desk so that the containers are more visible and less apt to attract contamination than when placed on the floor.

Certain rooms (e.g. office, typing classroom, mimeograph room) may need more than one small container because of the large volume of paper recovered. Certain classrooms (e.g. art room, science lab) should not have a container because contamination is too difficult to control. There should be no containers in the cafeteria or corridors, again because contamination is too difficult to control.

For Storing and Shipping Paper
Recovered paper is usually stored, and transported to market, in reusable jute bags. The required number of jute bags, each to contain about 15 kg. (33 lbs.) of paper, will depend on the quantity of paper stored between shipments to market. For example, if 907-kg. (1-ton) pick-ups or deliveries are made, then 60 jute bags will be needed to store paper between shipments (907 kg. ÷ 15 kg. per bag = 60 bags). This figure assumes that 60 jute bags (the same bags or substituted bags) will be left behind at the school by the dealer's truck driver, or that the 60 jute bags will be returned to the school by the driver of a donated/rented truck. If jute bags are also used to line classroom/staff area drums, then additional jute bags will be required. For example, if 40 bags are used as liners, then 40 should be added to the number of bags needed for storage/shipping.(Fewer jute bags will be required for storage if they are to be filled to capacity, approximately 23 kg. (50 lbs.), but full bags are difficult for most persons to lift.)

Under some storage circumstances (See Step 4.), it may be appropriate for bagged paper to be stored in covered, "45-gallon" drums. There are other container options that might be chosen on the basis of quantity of paper recovered, storage capability, transport method, and financial resources. For example, a special covered plywood bin on wheels might be constructed by the shop class or as a club project. Collected paper could be put directly into the bin loose, or could be stored in jute bags before being transferred into the specially constructed bin. The bin's cover would afford some protection from fire hazard. The bin could be wheeled onto and

off of a vehicle via loading dock. Paper could be emptied out of the bin through a fold-down side panel. Other types of containers could be designed to suit circumstances.

For Moving Paper from Classrooms and Staff Areas to Storage

As long as they are not too heavy, smaller containers full of paper, or bags lining fibre drums, can be carried to the storage area and emptied into storage containers. Another option is to borrow custodial carts, available in some schools for refuse collection. The contents of classroom and staff area containers could be emptied into these carts, and wheeled to the storage area. (This option does not apply to multi-level schools without elevators. Also, if this option applies, access to a freight elevator is assumed to be available for collection of recovered paper.)

Considering Costs

Decisions about containers to be used will be influenced by cost* considerations. New plastic dish pans can be purchased for under $1 each from kitchenware outlets. Second-hand fibre drums, available in various sizes, can be obtained for $2-$3+ each from drum/barrel suppliers (Check the Yellow Pages under "Barrels and Drums."), and from industries that sell empty drums after contents are consumed. Boxes of uniform size can be purchased, but it is cheaper to "scrounge" boxes of relatively uniform size. Jute bags may be available as a dealer-provided service, or can be purchased second-hand for $.40+ each from bag suppliers (Check the Yellow Pages under "Burlap."). If bags are to be used as drum liners, then the bag size must be appropriate for the drum size. Wooden bins on wheels may be available as a dealer-provided service, or can be constructed for the cost of materials. Second-hand "45-gallon" metal drums with covers are available from the same sources as fibre drums, and cost $5+.

CHOOSING A COLLECTION METHOD

The method of transferring paper from classroom and staff area containers to storage requires careful initial planning and good organization on a continuing basis. Collection must be carried out by trained, reliable persons who will:

1. Empty out containers before they overflow, and transfer collected paper to storage. Most classroom containers need to be emptied once per week, while staff area containers and typing room containers need to be emptied as often as once per day depending on the size of the container and the amount of paper recovered. Containers will need to be emptied more frequently during end-of-term clean-out campaigns.
2. Remove any contaminants found in containers during collection. Although regular promotional reminders are effective in reducing most of the contamination potential, additional effort to remove contaminants is considered essential during the collection process. Collectors must know exactly which papers are acceptable and unacceptable.

The exact method of collection will depend on circumstances at each school. There are three basic methods:

Method 1:

An individual is responsible for emptying one container from a specific room whenever the container is nearly full. This method is applicable to the primary school level where teachers play an important role in operating the program. This method is also applicable to recovery programs operated by the student council. The individuals who perform collection may be teachers and/or teacher-appointed students, or council homeroom representatives. In this method, each volunteer collector usually needs to obtain the key to the paper storage room from the school office or custodian whenever paper is transferred to storage.

Method 2:

A team is responsible for emptying all containers on a regular schedule. Generally, the school is divided into a number of collection areas, and several rooms are assigned to each member of the team. Team members usually work in pairs, and perform collection before or after school hours. In this method, the team usually needs a key to open class and staff rooms that are locked, but the storage room is usually kept open at collection time. The number of persons on the collection team will depend on the size of the school and other factors such as the need for persons to help with contaminant removal and filling of bags in the storage area. In existing school waste paper recovery programs, collection team sizes range from eight to thirty persons.

Method 3:

The custodian empties containers as part of normal waste management procedures. Although most custodians are helpful in many existing school waste paper recovery programs, as yet there are no known programs in which custodians perform all of the collection work. (See Step 10, in which the involvement of custodians would be part of a board-wide program.)

Regardless of which method is adopted, collectors will need to be trained in procedures to be followed, and some mechanism will need to exist for collectors to report contamination problems to the co-ordinator. In the first two methods, co-ordination will be essential to ensure that work is being carried out properly. In the second method, often called the "blitz" method, a checklist of room numbers is useful:

* Prices cited are approximate only, and are subject to change. A grant or loan from the Home & School Association or Student Council could be investigated to help cover container costs.

as containers are emptied, room numbers are checked off, which enables the co-ordinator to know which rooms were missed in the blitz and will need to be reassigned for special collection.

When emptying containers, collectors should leave a few sheets of acceptable paper in the containers as samples of materials being recovered. If computer papers, generated in special areas, are to be sold separately from the main grade targeted for recovery, then collectors will need to keep the valuable papers separate from other ledger during collection and transfer to storage. (In most school waste paper recovery programs, computer papers are simply combined with other ledger in order to eliminate the inconvenience of keeping valuable papers separate during collection, storage, and shipment to market; that is, the extra revenue for these valuable papers is not considered to be worth the extra effort involved.) In some cases, there may be special collection procedures for examination booklets. For example, in a recovery program, teachers might be asked to tear in half and box exam papers instead of depositing them into normal classroom/staff area containers; at exam time, for confidentiality purposes, the collection procedure might involve collecting these boxes and mixing the exam paper pieces with other paper.

Step 6: Developing a Promotional Strategy

The success of the recovery program will depend upon the co-operation of everyone in the school: students, teachers, administrators, clerical workers, and custodians. These participants will need to know why the program is being established and exactly what they are expected to do. The object of Step 6 is to plan a promotional strategy for informing everyone about the purposes of the program and the procedures to be followed. Although the exact kind and amount of promotion to be carried out will depend on circumstances at each school, every promotional planning process includes designing printed information materials and preparing for a three-phase — advance, start-up, and ongoing — promotional effort.

DESIGNING PRINTED INFORMATION MATERIALS

As a foundation for promotional activity, the recovery program's purposes and procedures should be recorded on paper. This written record will later be useful background information for various persons who will make various contributions in the three promotional phases. The background information record can be written in simple point form, and should cover the following five points:

1. Why the program is being started
2. How the program will operate
3. How much paper can be recovered*
4. What type of paper will be recovered (A list of specific acceptable and unacceptable materials should be included or attached.)
5. Program costs and revenues

(See Appendix D for a detailed, sample background information record, and Appendix B for a specific list of acceptable and unacceptable materials.)

The second type of printed information to be designed is the poster for marking classroom/staff area containers. The size of the poster will depend on the size of the container to which the poster will be attached. The artwork on the poster will depend on resources available for graphic design. Since the entire list of specific acceptable/unacceptable materials would not fit on a poster, the list will need to be made shorter and more general. (Shorter lists are less informative, but are more likely to be read, than longer lists.) Enough posters should be reproduced for the number of containers to be used, but extra copies could be posted in general areas and will likely be needed as replacements for some of the initial posters. (See Appendix C for a sample poster design.)

PREPARING FOR THE THREE PHASES OF PROMOTION

There are three phases of promotion: advance, start-up, and ongoing.

Advance Promotion

This phase of promotion about the coming program occurs before the actual start-up of operations. Advance promotion primes the participants so that everyone will be ready. In the following list of advance promotional tactics, the first two are considered essential, and the other five are tactics which should be judged for their suitability on a school-by-school basis:

- A memo from the principal to all teachers which asks for their co-operation. Such a memo lends formal endorsation to the program.
- A session with the custodian in order to explain the program. This session may not be necessary if the custodian has been involved in the other planning steps.
- An announcement at a student assembly.
- An article in the school newspaper**.

* Translating paper recovered into trees saved helps participants to visualize their impact on the environment; therefore, this equation is useful for promotional purposes: 1 tonne of paper = 18 3/4 trees (1 ton of paper = 17 trees). Example: 2 tonnes of paper recovered to date X 18.75 trees saved per tonne = 37.5 trees saved to date.

** For planning purposes, the copy submission and publication deadlines of the newspaper should be determined, along with other relevant information such as who (i.e. the editorial "staff" or the co-ordinator) will be responsible for writing about the recovery program.

- A slogan and/or logo contest held to obtain design ideas for posters and further promotion.
- A presentation at a staff meeting or professional development day.
- "Teaser" posters.

Note that all persons involved in advance promotion will need a copy of the background information record, including the detailed list of acceptable/unacceptable materials, in order to effectively explain the program.

Start-up Promotion

This intensive phase of promotion occurs on the day designated for start-up of operations. On start-up day, containers and container posters will be positioned in classroom/staff areas. In order to prevent misuse of containers and confusion about acceptable/unacceptable materials, information must be provided early in the morning on start-up day. Assuming that participants have already been primed on program rationale, start-up day promotion should concentrate on paper acceptable for recovery, i.e. flat, fully used ledger paper only. (See Appendix D, "What Type of Paper Will Be Recovered," as a good way of "getting the message across."). The following tactics are suggested for start-up day promotion:

- An announcement made over the public address system by the principal.
- A notice published in the daily announcement list provided to teachers. The notice would ask teachers to follow up the principal's announcement with an additional reminder. The notice could encourage teachers to allow for a brief question and answer period, and to demonstrate actual samples of acceptable/unacceptable materials.
- A briefing session for clerical and other non-teaching, non-custodial staff. A short session for these staff persons is essential in order to reduce the contamination potential from office materials, e.g. kraft envelopes, stencils, carbon paper, facial tissue, glossy advertising literature, and so forth.

Note again, that persons, especially teachers, involved in start-up promotion will need a copy of the background information record and a detailed list of acceptable/unacceptable materials. Depending on the time and resources available to the co-ordinator, many additional promotional tactics could be planned for start-up day.

Ongoing Promotion

All recovery programs need to be promoted on a continuing basis for two reasons: to keep the quantity recovered high, and to keep the amount of contamination low. As time passes, participants tend to become lax about putting recoverable paper into containers and tend to forget about unacceptable material rules.

When the program is operating, the co-ordinator will be monitoring the quantity recovered and the amount of contamination. The results of this monitoring should be publicized in periodic updates about program progress. It is important for updates to include not only warnings about contamination, but also good news about amounts sold, trees saved, dollars earned, exemplary classes, dedicated volunteers, and so forth. Although contamination is likely to be a major ongoing concern, too much criticism about contamination can irritate participants and damage the program. Nevertheless, strong reminders about avoiding contamination should be issued during clean-up campaigns, especially end-of-term locker clean-outs. Severe contamination has resulted at some schools at such times. The following tactics are suggested for ongoing promotion:

- Short announcements made over the public address system once per week.
- Periodic notices published in the daily announcement lists provided to teachers. The notices would ask teachers to announce the update information.
- Articles in the school newspaper. Each issue could highlight a different aspect of the program through news, feature, or column formats.
- New sets of posters. Each set could highlight a different aspect of program progress.

Considering Costs

The co-ordinator will need to consider the cost of the promotional strategy being developed. The background information record, the container poster, other posters, and additional tactics beyond those listed here, will entail costs. As in the case of container costs, initial promotional costs will be incurred before revenues from the sale of paper are available. Certain promotional costs may be able to be absorbed by a department, especially if the program is a class or club project; otherwise, some form of fund-raising will need to be carried out. Note that fund-raising for the recovery program could be a form of advance promotion.

Step 7: Calculating Estimated Costs and Revenues

The educational value of a recovery program is normally considered to be more important than its financial status. Nevertheless, a businesslike comparison of projected costs and revenues is an essential step in planning the program.

When a cost-revenue comparison is being drawn up, decisions will need to be made about items to be represented in this budget estimate. Certain actual costs, such as the purchase price of metal drums, should be represented. On the other hand, it would not be logical, in the case

of a school, to list certain other costs, such as volunteer labour for decorating classroom containers. There are also items which may or may not be represented. For example, the science department could be paying for printing, and a parent could be donating use of a truck for delivering paper to market. If the recovery program will be repaying the science department, and covering the parent's fuel expenses, then these costs should be represented in the budget; however, if repayment and reimbursement are not expected by the department or the parent, then these costs may not need to be represented in the program budget estimate.

The following two examples of first-year cost-revenue comparisons are based on these assumptions:

- a high school with 1200 students enrolled;
- a building with 40 homerooms and other classrooms, and three staff areas (clerical office, teacher office area, and ditto/photocopy room) which will have containers;
- an estimated quantity of 3612 kg. of paper recoverable in the year;
- inside storage space and dealer-provided pick-up available in the first example only;
- "coloured ledger" market prices of $88 per tonne ($80 per ton) delivered, and $72 per tonne ($65 per ton) picked up.

Example A:

		AMOUNT ($)	
Start-up Costs*			
plastic dish pans (43 @ $.90 including tax)	38.70		
photocopying of background records and container posters (60 two-page records and 70 posters = 190 pages @ $.10)	19.00		
Total start-up costs		57.70	
Operating Costs			
dealer-provided pick-up and provision of jute bags	n/c		
Total operating costs		0	
Total costs (first year)			57.70
Revenues			
sales of recovered paper (3.6 tonnes @ $72)	259.20		
Total revenues			259.20
Net revenue (loss)			201.50

Example B:

		AMOUNT ($)		
Start-up Costs*				
boxes for classrooms (40 @ n/c)	n/c			
fibre drums for three staff areas (3 @ $3 including tax)	9.00			
jute bags (30 for 450-kg. deliveries to market, +3 for lining fibre drums = 33 bags @ $.40 including tax)	13.20			
covered metal drums for outside storage (10 @ $7 including tax)	70.00			
photocopying (as in Example A)	19.00			
Total start-up costs		111.20		
Operating Costs				
delivering to market (8 trips in rented panel van @ $30)	240.00			
Total operating costs		240.00		
Total costs (first year)			351.20	
Revenues				
student council grant toward start-up costs	50.00			
sales of recovered paper (3.6 tonnes @ $88)	316.80			
Total revenues			366.80	
Net revenue (loss)				15.60

The costing of the program to be established will vary from these examples according to aspects of planning in Steps 2-6.

After comparing costs and revenues, it may be necessary to adjust aspects of the planned program. For example, in B, if $111.20 cannot be raised to cover start-up costs, then the purchase of covered metal storage drums may need to be reconsidered, and an alternative storage space will need to be identified. Furthermore, in B, more than eight deliveries to market would mean that the program will likely operate at a net loss, unless an alternative transport method can be identified.

The costing of the program provides information needed for initiating a fund-raising campaign if one is necessary. Note that any start-up costs are incurred before revenues from the sale of paper are available. A grant or loan may need to be obtained from the Home and School Association or the Student Council to cover start-up costs. Other forms of fund-raising are possible. Under certain circumstances, start-up costs are not always incurred. For example, if boxes are employed as room containers, if printing costs are absorbed by a department, and if dealer-provided jute bags are available, then there would be no initial costs for such a program.

The costing of the program helps to provide an answer to a question very likely to be posed by the principal: What will the program cost?

* In most budgeting methods, start-up costs are spread over a number of years so that the first-year economic picture of a program is not unfavourably distorted by once-only costs. The second and following budget years would normally contain a portion of start-up costs, plus an allowance for equipment which will need to be replaced. In these budget examples, start-up costs are listed in full because it is useful to isolate costs that will need to be covered before revenues from sold paper are available.

Step 8: Starting the Program

Program start-up is the step in which the planning from earlier steps is put into operation.

CHOOSING THE START-UP DATE

A specific date must be designated as the day on which the program will begin to operate. The start-up date should not be a Friday, or any date on which another special event will compete with recovery program start-up. Allowing for planning time — usually a one-month period — the start-up date should be slated for as early in the school year as possible. A date in late September, or soon after Thanksgiving in early October, would help participants to develop the habit of keeping ledger paper separate, before they become too accustomed to mixing paper with garbage. The start-up date should not be in May, June, or December, when holidays are approaching. The start-up date could be in November, January, or February, if planning could not be completed early in the year. A March or April start-up date is also possible, but will not provide as much program operating experience as will an earlier start-up date. With a later start-up date, it is usually more difficult to recruit persons, already committed to other school activities, to help in program planning and operation.

Preparing for the Start-up Date

By start-up day, all aspects of program planning must be complete as in the following checklist:

- Raise funds, if necessary, to cover start-up costs.
- Finalize arrangements with the buyer, and confirm that paper will be able to be transported to market.
- Confirm that the area previously located will be designated for paper storage.
- Obtain the containers needed for holding paper at each stage of handling.
- Recruit and train the persons responsible for collection and other activities.
- Design and reproduce the container poster and any other printed materials needed for promotion.
- Carry out advance promotion, with particular emphasis on informing teachers and custodians about procedures.
- Make all necessary arrangements for start-up promotion.

Carrying out Activities on the Start-up Date

On start-up day, there are two activities to be carried out, and these activities require good co-ordination:

1. Containers are distributed in classroom and staff areas, and posters are attached onto or nearby these containers.
2. Start-up promotional announcements are made.

The distribution of containers and posters is normally carried out by the same persons who will collect paper. These containers should not be distributed before start-up day because they are likely to be misused. In some cases, containers are distributed before start-up day, but they are kept in storage spots until announcements are made about their purpose as "recycling" containers.

Step 9: Operating and Improving the Program

In addition to careful initial planning and good start-up organization, the recovery program requires good ongoing management. Ongoing management responsibilities include the following:

- Maintain smooth day-to-day operation of the program. It is particularly important to ensure reliable collection of paper from classroom/staff area containers, and regular transport of stored paper to market. Any container overflow can damage the reputation of the program. A poorly managed collection operation will result in the loss of the principal's support, and will be a "let-down" for once-enthusiastic participants. Some sample operating problems that have been solved in various schools include: theft or vandalism of containers; mistaken disposal of containers and/or contents into the garbage by custodians; disappearance of container posters; failure of collectors and/or promoters to perform duties; container overflow, especially during clean-up campaigns; delays in pick-up delivery service; confusion about what to do with "confidential" exam papers, since this procedure was not made clear in promotion; and rejection of contaminated loads by the paper buyer.
- Carry out ongoing promotion. Continuing promotion will help to achieve a high rate of recovery of the available paper, and a low contamination level in the recovered paper.
- Keep a record of data related to the program. A record should be kept of the amount of paper recovered and revenue earned. A chart such as the following would be useful:

Date	Quantity Shipped (if paper can be weighed before it leaves the school	Quantity Accepted by Buyer	Price per Unit	Gross Revenue	Quantity Rejected (if any rejected, plus reasons for rejection, and examples of types of papers rejected)

A record should also be kept of all expenditures, both initial and ongoing, i.e. costs incurred in starting the program, in replacing and/or adding containers and printed materials, in delivering paper to market, and so forth. A bank account may need to be opened, unless program finances are managed by the school administration, a department, or an existing organization.

- Ensure the continuation of the program from year to year. Achieving continuity includes training a new co-ordinator if an existing co-ordinator is leaving. Continuity is aided if supportive staff and experienced collectors are available in the following year to assist in re-starting the program. (Under some summer-school circumstances, it may be advisable to temporarily suspend the program and place all equipment in storage to prevent its misuse, if reliable collection and promotion cannot be maintained during this period.)
- Aim to improve the educational value of the program, once the program is operating smoothly. For example, re-use could be emphasized to assure that paper is used on both sides before being deposited into containers, or heat and light conservation in the school could be promoted along with the recovery program, or aspects of the recovery program could become class research projects . . . There are many possibilities.
- Convey a positive attitude toward the program. Projects of any kind, especially those which require new attitudes and practices, are bound to encounter some resistance from participants. The personal enthusiasm, dedication, and perseverance of the co-ordinator and collection/promotion helpers will be essential to the success of the recovery program.

Step 10: Considering Expansion of the Program

So far, this Guide has described the procedure for establishing a recovery program at an individual school. The major challenge in establishing such a program is presented by three interrelated factors: quantity recovered, storage capability, and shipment to market. Since there is a relatively small quantity of recoverable paper available in a typical school, the recovered paper will either need to be stored for a period of time long enough to be shipped to market in economical loads, or need to be shipped to market more frequently in smaller, uneconomical loads, if it cannot be stored long enough for economical shipments. Under certain circumstances, the three-way problem of quantity-storage-shipment need not arise because there is either a capability for long-term storage, or an available method of transporting paper to market frequently; however, under most circumstances, it is best to be prepared to meet the challenge. In this step, two possible solutions are presented to the quantity-storage-shipment challenge. Both solutions involve expanding the recovery program from an individual school to other schools.

CO-OPERATING WITH OTHER SCHOOLS

An increasing number of principals, teachers, and students, are becoming interested in establishing school waste paper recovery programs; therefore, it would make sense to contact key persons at other, nearby schools in order to explore opportunities for co-operating, especially for transportation purposes.

If several school waste paper recovery programs are established in the same general locality, then a waste paper dealer, interested in the combined total load, may be willing to pick up smaller loads of paper from each school; consequently, each school could be provided with more frequent pick-ups than if only one school were on the dealer's route. If dealer-provided pick-up is not available, then several schools could co-operatively rent a vehicle for delivering paper to market; again, smaller loads could be shipped from each school contributing to the total, and each co-operating school could ship more frequently than if each individual school were attempting to store paper long enough for economical deliveries. More frequent, co-operative deliveries will cost relatively more for each contributing school, compared to less frequent, individual deliveries (and compared to less frequent, co-operative deliveries); however, the shorter storage periods will be a major advantage if lengthy storage periods are a problem.

Consider the following comparisons, under various circumstances, between a single school and three co-operating schools. Although the enrolment at each school is likely to be different, 84 kg. will be assumed as the quantity recovered per week at each school. Revenue is assumed to be $88 per tonne delivered. Truck rental is assumed to be $30 and $40 per day, depending on vehicle weight capacity, plus an additional $5 for inter-school travel when the truck is shared. Mathematics are approximate only, in order to keep the example simple.

Circumstance	Number of Schools	Weight of Load Shipped (kg.)	Approximate Storage Period and Shipping Interval for Each School (wks.)	Cost per Load ($)	Revenue per Load ($)	Net Revenue (Loss) per Load ($)	Net Revenue (Loss) for Each School ($)
Comparison A:		*					
If delivering a minimum 227-kg. (500-lb.) load	1	227	3	30	20	(10)	(10)
	3	76 each X 3 228 total	1	35	20	(15)	(5)
Comparison B:				*			
If aiming to "break even" on the cost-revenue per load	1	341	4	30	30	0	0
	3	133 each X 3 399 total	2	35	35	0	0
Comparison C:		*					
If filling a "3/4-ton" (680-kg.) panel van	1	680	8	30	60	30	30
	3	227 each X 3 681 total	3	35	60	25	8
Comparison D:			*				
If delivering once per month	1	336	4	30	30	0	0
	3	336 X 3 1008	4	45	89	44	15

* The starting points for each horizontal comparison are different; therefore, there is some distortion when comparing vertical columns, e.g. in 4 wks., 336 kg., or 340 kg., or 341 kg., might be shipped.

The four comparisons show the interaction among quantity shipped, storage duration, and shipping cost. In the first comparison, minimum 227-kg. deliveries to an agreeable dealer are uneconomical for both the single school and the co-operating schools; however, the shared losses are less for each co-operating school than for the single school. In the second comparison, the calculation starts with the cost of delivering loads as "given." The cost per load determines the revenue per load that must be achieved to off-set the cost, and the revenue to be achieved determines the quantity of paper that must be shipped. In this comparison, the storage period can be cut in half by co-operative shipping. In the third comparison, in which the weight capacity of the van determines the amounts to be shipped, the co-operating schools each receive less "profit," but need less storage time than the single school. In the fourth comparison, approximate one-month storage periods enable the co-operating schools to ship profitable loads even though a larger vehicle is needed, compared to the single school which can only "break even" by shipping once per month.

Besides the reduction in storage time which can be achieved through combined shipping, there may be additional advantages to co-operating with other schools which are establishing recovery programs. For example, one container poster could be designed for several schools; the unit cost of the posters could decrease with the number reproduced; equipment such as dish pans and jute bags could be cheaper per unit if purchased in bulk; and duplication could be eliminated in initial research and ongoing communication with the paper buyer. (Note that in co-operative shipping, it is advisable for each school to code its delivery containers so that the source(s) of any severe contamination will be able to be identified; therefore, the relevant school(s) can be contacted by the buyer for purposes of correcting the problem in future.)

SUGGESTING A BOARD-WIDE PROGRAM

The advantages of co-operation may be even more dramatic when a recovery program at an

individual school is extended to all schools within the jurisdiction of a school board.

The process of expanding from an individual program to a board-wide program would normally begin when a group of concerned persons sends a letter and/or makes a presentation to the school board. Contents of the letter and presentation would include an outline of the value of recovery, a description of the successful existing program(s), statements of support for expansion, and a recommendation that a board-wide recovery program be investigated, and implemented, if feasible. In addition to formal letters and presentations, informal contacts with trustees and sympathetic staff are essential in the process of urging change.

In a board-wide program, the quantity-storage-transport challenge could be met through frequent "milk-run" pick-ups by existing board courier or refuse fleet vehicles. The collected material could be taken directly to a local market, or could be stored in a central facility while awaiting delivery to market or buyer-provided pick-up. A board staff person in charge of physical operations could research the exact equipment and labour requirements of such a system, which would likely cost less than independent transport by each school.

There would be other advantages of a board-wide program. Cost and effort at the individual schools would be reduced due to the elimination of duplication; that is, central marketing of all paper, administering a contractualized arrangement with a buyer, bulk purchasing of equipment, mass printing, and accounting, would likely be performed by board staff.

In a board-wide program, recovery would become an official waste management practice in each school. Deposit of ledger paper into containers would become the responsibility of all school persons. Teachers (as educators) would instruct students about paper quality procedures, thus reducing the dependence on heavy program promotion by volunteers. Custodians (as waste collectors) would transfer paper to storage. The involvement of custodians would eliminate the need for volunteer-run collection operations with associated problems of recruitment, reliability, and dependence on personal enthusiasm. Some changes in union contracts or job descriptions may be necessary when custodians become paper collectors. As an official waste management practice, the quantity recovered could come closer to 100% of what is available, compared to a volunteer-run program. Perhaps the most significant effect of formal board endorsement for the program would be the creation of a climate in which all persons — principals, teachers, custodians and students alike — would play a part in establishing the overall program at individual schools.

At present, school waste paper recovery programs are being established by volunteers whose personal enthusiasm allows them to meet the challenges presented by such programs. In future, the necessity to conserve resources and reduce waste would be aided by the establishment of more formal systems which have the endorsement of boards and the involvement of board staff, as well as the personal enthusiasm of all participants. In the interim, well planned, well organized, successful volunteer-run programs will enable more persons to become familiar with at-source waste recovery, and will increase the likelihood of the establishment of board-wide systems.

APPENDIX A
Waste Ledger Paper Dealers and Brokers Active in Ontario

Brunswick Waste Removal
276 Brunswick Avenue
Toronto (416) 925-4614

Buscombe and Dodds Ltd.
255 Wellington Street West
Toronto (416) 363-1444

Cambridge Recycling
54 Cedar Street
Cambridge (519) 622-1883

Consolidated Fibres Ltd.
95 Commissioners Street
Toronto (416) 461-0211

Data Surplus Cards Ltd.
1860 Shawson Drive
Mississauga (416) 771-0660

Domtar Packaging Recycling Operations
451 Front Street East
Toronto (416) 364-6226

Elliot Krever and Associates Ltd.
150 Consumers Road, Suite 105
Toronto (416) 491-4147

F. Fiore and Sons Ltd.
5731 Stanley Street
Niagara Falls (416) 358-3668

Florence Paper Company Ltd.
2475 Sheffield Road
Ottawa (613) 745-9437

Genor Services
401 Elgin Street
Brantford (519) 756-5264

Gold and Gold Recycling Industries Inc.
555 Bathurst Street
London (519) 672-9000

Hanna Paper Fibres Ltd.
2750 John Street
Markham (416) 495-9844

The Levis' Paper Fibres Ltd.
199 Eastern Avenue
Toronto (416) 364-7241

Mill Paper Fibres
162 Ferguson Street North
Hamilton (416) 522-6010

Mill Paper Fibres Ltd.
20 Trinity Street
Toronto (416) 364-6255

Recycling Council of Ontario
477 Dupont Street
Toronto (416) 533-6757
(performs services for its marketing members, e.g. school boards)

Renfrew County Recycling Ltd.
P.O. Box 65
Pembroke (613) 732-4910

Sonoco Ltd.
33 Park Avenue East
Brantford (519) 752-6591

Textile and Paper Waste Sales Ltd.
116 George Street
Toronto (416) 362-1616

APPENDIX B
Specific Acceptable and Unacceptable Materials for a School Coloured Ledger Paper Recovery Program*

ACCEPTABLE:
All white and coloured writing and printed ledger papers, such as:

mimeograph paper
photocopy paper (except slick, wet copier paper)
notebook paper (without covers and bindings)
exercise paper (non-newsprint)
sheets of paper torn from pads (without cardboard backing)
exam booklets
typing tissue paper
computer printout
computer tab cards
index cards
binder dividers (without plastic tabs)
business forms (without carbon paper)
white envelopes (without plastic windows)
light tan (manilla) file folders
(Staples and paper clips allowed in small quantities)

NOT ACCEPTABLE:

All non-ledger papers, such as:

newspapers and newspaper clippings
newsprint-type exercise paper
magazines
glossy paper, e.g. advertising literature, pamphlets, catalogues, wrappers, posters, greeting cards, etc.
paperbacks
glue-bound books and reports
food and candy wrappers
facial tissues
hand towels
paper bags
boxes
cardboard
construction paper
report and notebook covers
record album covers
mimeograph stencils and ditto-masters
carbon paper
brown/tan (kraft) envelopes
envelopes with plastic windows
label backings

All non-paper materials, such as:

cans and other metal
bottles and other glass
food
cloth scraps and clothing
wood
plastic bags
aluminum foil
pens
pencils
crayons
rubber bands
metal notebook bindings
plastic notebook covers
arts and crafts materials
string and other strapping for packaging
science lab biological wastes

* For a White Ledger recovery program, no coloured paper of any kind is acceptable.

APPENDIX C
Sample Design of a Poster for Marking the Locations of Waste Paper Recovery Containers

Posters such as this one should be attached to every container and/or to a wall nearby every container. Poster size and artwork will depend on circumstances at each school.

PAPER RECYCLING
DROP BOX

ACCEPTABLE: ALL WHITE AND PASTEL WRITING AND PRINTED LEDGER PAPER (Must Be Flat)

NOT ACCEPTABLE:

NEWSPAPER, MAGAZINES, PAPERBACKS
TISSUES, HANDTOWELS,
FOOD & CANDY WRAPPERS, LUNCH BAGS
BOXES AND OTHER CARDBOARD
YELLOW/TAN (NEWSPAPER) EXERCISE PAPER
METALS AND PLASTICS
CONSTRUCTION PAPER AND CLOTH
GLOSSY PAPER
STENCILS AND CARBON PAPER
BROWN ENVELOPES AND ENVELOPES WITH PLASTIC WINDOWS
GLUE-BOUND REPORTS
(REMOVE AND DISCARD NOTEBOOK COVERS AND SPIRAL BINDERS)

APPENDIX D
Sample Background Information Record for Persons Helping with Operation and Promotion

This summary provides details about the waste paper recovery program which is being established at our school.

THE PURPOSE OF THE RECOVERY PROGRAM:
Instead of becoming garbage, school waste paper can be kept separate from garbage, and can be recycled into new paper products. The process of keeping waste paper separate for recycling is called "recovery." The advantages of paper recovery and recycling include the following:

- Less garbage will be produced in the school. The reduction of school garbage results in lower garbage collection and disposal costs, less transportation energy for hauling garbage, less land for burying garbage, and lower air and water pollution from disposal processes.
- The school waste paper will be substituted for a portion of the raw wood pulp needed for making new paper products. This substitution reduces the number of trees that need to be harvested. This substitution also reduces the energy consumed, and the air and water pollution produced, in the paper manufacturing process.
- Since conservation is a topic in environmental studies, science, geography courses, the recovery program will make education more practical. The program will provide students with waste management skills that will be increasingly important at home and in career roles.

HOW THE RECOVERY PROGRAM WILL OPERATE:
The head of the Geography Dept., _____, will co-ordinate the program with the help of geography students. The program has been planned carefully, and will start on _____. On _____, a cardboard box will be placed in every classroom (except the art room), and a large drum will be placed in every staff area and in the typing classroom. Each container will be marked by a poster, placed on or nearby the container. Staff and students are asked to place recoverable paper into these containers instead of into wastebaskets. Once per week, or more often if necessary, a team of geography students will empty the containers, and transfer the collected paper to a storage area in the school. The stored paper will be periodically transported to a waste paper buyer which supplies the paper mills where waste paper is recycled into new products.

Although waste paper recovery is a new way of managing a large part of the school's wastes, the system is simple — students and staff simply put recoverable waste paper into the recycling containers instead of into wastebaskets. The rest of the system is the responsibility of the geography student team and its co-ordinator.

HOW MUCH PAPER CAN BE RECOVERED:
The _____ students and staff here produce about _____ kg. of recoverable paper per week, and probably more during weeks when exam papers are discarded and locker clean-outs occur. This weekly average amounts to _____ kg. per year, and is equivalent to _____ trees which can be saved if all students and staff co-operate in the waste paper recovery program.

WHAT TYPE OF PAPER WILL BE RECOVERED:
The type of paper to be recovered is known as high-grade ledger paper. Ledger includes all white and coloured writing and printed bond papers. (Examples of acceptable papers from Appendix B can be cited.) Our recovered paper will be recycled at paper mills in the following manner: In the high-grade waste paper recycling process, inks and colours are first washed out of the waste paper, and then the de-inked fibre is mixed with water, chemicals, and bleached wood pulp, into a kind of paper soup. The soup-like material is sprayed onto screens, rolled out into new paper, and dried with hot air.

It is very important that all non-paper wastes and non-ledger papers be kept out of the recovery system. Non-paper wastes include used items made of, or containing, some plastic, cloth, wood, food, rubber, glass, metal, glue and so forth. Most of these non-paper wastes do not dissolve in water; therefore, they are not acceptable for waste paper recycling. Furthermore, it should be obvious that non-paper wastes cannot be made into paper! (Examples of non-paper materials from Appendix B can be cited.) Non-ledger papers include hygiene papers (tissues, hand towels), coated (slick, glossy) papers which do not dissolve in water, and low-grade papers which look naturally tan or grey, and/or contain tiny flecks of wood. Non-ledger papers have fibre structures and chemical compositions which make such waste papers unsuitable for high-grade recycling. (Examples of non-ledger papers from Appendix B can be cited, especially cardboard, construction paper, and newsprint-type exercise paper.)

Remember then, that non-paper wastes and non-ledger papers are not allowed in the recovery system because these materials are not acceptable in the recycling process. Both categories — non-paper wastes and non-ledger papers — are called "contaminants." If contaminants are mixed in with our recovered paper, then either the value of the recovered paper will be reduced, or worse, the recovered paper will be worthless for recycling. When placing paper into the recovery program containers, students and teachers should stop and think: Does this paper product contain any non-paper material? Does this paper contain any coating (slick, glossy appearance), or glue, which will not dissolve? Does this paper look naturally tan or grey, or contain any tiny flecks of wood, which indicate that it is low-grade paper? The co-operation of teachers is needed to help students understand the types and effects of contaminants which should not be put into the recovery program containers.

We want to recover as much waste paper as possible, but only the correct type of paper, and only paper that has been fully used, i.e. used on both sides. It is also important to put only flat paper into the containers, since crumpled paper takes up more storage space. Also, exam booklets should be torn in half before being put into the boxes or drums.

PROGRAM COSTS AND REVENUES:
Although profit is not one of the reasons for establishing the recovery program, the sale of the school waste paper will likely result in revenue for the school. Ledger paper, without contaminants, is currently worth _____ per tonne when delivered to the paper buyer. If all available paper at our school is recovered, then the gross profit could be a maximum of _____ per year. Of this, _____ will need to be repaid to the Home & School Association which loaned expense money for drums and printed materials. An additional _____ will need to be paid per year for rental of a truck to deliver paper to the buyer. The net profit after costs in the first year could be _____, to be put into a fund for a yet-to-be-determined, worthwhile school cause.

THE CO-OPERATION OF EVERYONE IS NEEDED:
The success of our waste paper recovery program depends upon everyone's co-operation and participation. We want to recover as much waste paper as possible, but only the ledger paper as described, and only flat paper that has been used on both sides. Any questions about the program should be directed to _____, the co-ordinator.

APPENDIX E
Sample Case History

As an example, the following case history portrays many aspects of recovery program planning, start-up, and ongoing operation.

In a collegiate institute with 1200 students enrolled, an environmental studies teacher agreed to take responsibility for a waste paper recovery program, and received authorization from the principal in early September.

Teams from the co-ordinator's classes, with help from the custodian, researched school waste. The researchers calculated that 96 kg. of high-grade paper was available for recovery per week, and that 77 kg. would be recoverable at an 80% recovery rate.

The co-ordinator located a waste paper dealer which agreed to accept minimum deliveries of 227 kg.; pay a price of $88 per tonne (delivered) for uncontaminated Coloured Ledger (net 30 days); supply jute bags; and provide feed-back information for each delivery made.

In deciding the grade to target for recovery, the co-ordinator was tempted to choose White Ledger because waste research

showed that there was very little coloured high-grade paper available, and because the price for White Ledger was about $10 per tonne more than for Coloured Ledger. On learning that the dealer's standards for White Ledger were very strict, and in being realistic about the probability that some coloured papers would be put into the recovery system, the co-ordinator chose Coloured Ledger instead. The dealer agreed to pay a bonus for Coloured Ledger deliveries which met the specifications for Manifold Coloured Ledger. Although the school had a computer terminal, the co-ordinator decided that computer papers would be boxed at the terminal, but would be emptied into Coloured Ledger storage bags, in order to avoid the inconvenience of recovering more than one grade of paper.

Although several students in the co-ordinator's classes owned vans, and were willing to deliver paper to market, the co-ordinator decided that the option of a rental vehicle, driven by a volunteer teacher, would need to be built into the plan. Small, rented panel vans with weight capacities of up to 680 kg. (1500 lbs.) were found to cost $30 per day, allowing for fuel; therefore, each delivery would need to achieve a revenue per load of at least $30, and each load would need to be 341 kg. ($30 "break-even" revenue ÷ $0.88 per kg. revenue = 341 kg.) in uncontaminated weight. Based on 80% recovery of available paper, delivery was slated for intervals of approximately once per month (341 kg. per load ÷ 77 kg. recovered per week = 4 weeks). Another environmental studies teacher agreed to share driving responsibilities. An empty, locked classroom was approved for storage of paper between deliveries.

Collection would be carried out in a team method by students (from the environmental studies classes) under the close supervision of the co-ordinator. Bright orange plastic dish pans were chosen to hold paper in 36 classrooms and 4 staff areas. No container would be placed in the art room because of the likelihood of heavy contamination.

Since the containers would be too small (squat) for a poster to be attached, large posters would be attached to walls nearby the containers. A poster listing acceptable/unacceptable materials, and containing a symbolic tree as a logo, was designed by the art teacher with the help of art students. This poster design was printed on bright orange paper to match the colour of the recycling containers. A total of 80 posters was printed, with one-half to be posted nearby recycling containers, and one-quarter to be posted in other areas in order to focus attention on the program. (The remaining copies were to be held in reserve as replacements for torn or missing posters.)

The cost of the containers and printing was covered by a grant of $75 from the Home & School Association, and a fund of $30 raised by the students. As soon as the money was raised, the containers were purchased, and the poster design was sent out for printing.

With an October 10th start-up date, advance promotion took the form of an announcement made by the principal at the first school assembly, and regular updates about the planning phase given by the co-ordinator at weekly staff meetings. Each teacher received a background information record and a detailed list of acceptable/unacceptable materials, and agreed to help students become familiar with "ledger" paper to be deposited into classroom containers. The custodian was briefed about the coming program, and agreed not to empty any orange pans of paper or labeled boxes of computer printout into the garbage.

On start-up day, 8 students delivered containers and posters to the 36 teaching areas and 4 offices (physical education, guidance, teachers', and main). Each student took responsibility for 5 rooms which were covered between 8:40 and 9:00 a.m. Following a brief general announcement by the principal over the public address system, each homeroom teacher repeated the promotional message with special emphasis on acceptable/unacceptable materials. The co-ordinator held a brief information session for clerical and other non-teaching administrative staff.

Since program start-up, collection has been carried out without difficulties in the following manner: First, a master list of the rooms in the school was prepared for collection purposes. On the list, the school is divided into 4 areas of 10 rooms each. Every Monday, 8 volunteers are recruited to collect paper on Thursday morning between 8:40 and 9:00 a.m. All volunteers fully understand what materials are acceptable and unacceptable in the Coloured Ledger grade targeted for recovery. On Thursday mornings, the 4 teams of 2 persons each, cover their assigned collection areas. Guided by their lists, the teams empty the contents of each classroom/staff area container into a cardboard box, pull out any contaminants, write down the contaminants found, and check off the room numbers. The boxfuls of collected paper are taken to the storage room where paper is transferred into jute bags. The checked-off lists used during collection, are valuable for two main reasons: First, if certain rooms are locked in the early morning, then a volunteer, with use of a key, will collect from such rooms at lunchhour. Second, if severe contamination is discovered in certain rooms, then teachers in such rooms are asked by the co-ordinator to take action to prevent further contamination. The boxes used in collection are brought to the co-ordinator's room every Thursday by the custodian. Boxes needed by staff for large clean-outs or confidential papers are delivered by the co-ordinator. The container in the main office needs emptying every day; therefore, on days other than Thursday, the co-ordinator collects paper from this container, and stores this boxed paper in her classroom from week to week.

Ongoing promotion is carried out by the co-ordinator who makes brief, weekly announcements over the public address system. Although warnings about the contaminants reported by collectors are mentioned every week, each announcement also attempts to relate paper recovery to other action, such as energy conservation, at-home newspaper recovery, ledger paper re-use, and so forth. In weeks when deliveries are made to market, the co-ordinator reports on the quantity recovered and equivalent number of trees saved.

The contaminants most frequently reported by collectors, and cited in weekly announcements, are newsprint-type exercise paper and candy packaging, especially gum boxes. The co-ordinator feels that these contamination problems result from a number of factors: the light tan, low-grade exercise paper is difficult to distinguish from acceptable pastel-coloured papers, despite the tiny flecks of groundwood visible in the exercise paper; there is a tendency for some students to be over-zealous about recovering all paper without regard for the consequences of contamination rules; and although teachers are generally co-operating, they could be more involved in instructing students about acceptable/unacceptable materials.

In the first month of program operation, the quantity recovered was much higher than initially estimated; however, this large quantity was likely due to the fact that persons were expecting the program, and began to save paper before start-up day. Since the first month, the quantity recovered has been closer to the predicted amount, and has varied from 70 to 85 kg. per week, except during the end-of-term locker clean-out when the quantity jumped to 230 kg. in one week alone.

At delivery time, student volunteers borrow the custodian's cart and wheel bagged paper from the storage room to the loading dock for transfer onto the truck. Two student volunteers always accompany the teacher driver on the trip to market. Although monthly delivery of recovered paper in a rented, volunteer-driven van has been successful due to the commitment of the other teacher, the co-ordinator is examining possible alternatives to the present transport system. One option is to donate the recovered paper to a community-based recovery program operator which offers a pick-up every two weeks. Another option is to locate a long-term storage space approved by fire officials, so that dealer-provided pick-ups of 907-kg. (1-ton) loads could be made every 3 months. Either of these options would help to eliminate the inconvenience of making frequent deliveries to market. Out of concern, and for practical purposes of co-operative shipping arrangements among several schools, the co-ordinator, through her memberships in educator associations, is also urging teachers in other, nearby schools to start recovery programs; however, she feels that the ideal program would be a comprehensive one operated by the board of education.

APPENDIX F
Glossary of Terms

At-Source Recovery: The process of keeping recyclable materials separate from other wastes at the point of waste generation, and other processes (e.g. collection, storage, transportation) necessary for the transfer of the separated materials to the waste materials recycling industry. (An alternative process is "mixed waste recovery" in which recyclable materials are allowed to become mixed with other wastes at the point of waste

generation, and are separated at a later stage, through mechanical or manual means, before being transferred to the waste materials recycling industry.)

Community-Based Recovery Program Operator: A local organization which carries out collection and other operations for the recovery of recyclable materials, primarily from residential, and sometimes also from commercial, institutional, and industrial waste sources.

Contaminant: Any material which, when mixed with recovered waste paper, reduces the value of the recovered waste paper. Contaminants include:

Outthrows: Any papers which are not acceptable as the grade of paper being recovered, e.g. newspaper would be an outthrow in a Coloured Ledger recovery program.

Prohibitive Materials: Non-paper wastes, such as plastic, glue-binding, glass, and metal, which are not acceptable in the recycling process.

De-inking: The chemical process of washing inks and colours from waste paper before it can be added to the high-grade recycling process.

High-Grade Paper: The general classification for papers which have a relatively high value, e.g. computer printout and ledger.

Jute Bag: A large, reusable sack, made from woven rope-like fibre. Such bags are often employed to line collection containers and to contain paper during storage and transport stages in waste paper recovery programs.

Low-Grade Paper: The general classification for papers which have a relatively low value, e.g. newsprint and cardboard.

Paper Baler: A machine in which papers are compacted, and strapped together into large bundles of, for example, 450 kg. (1000 lbs.) each, for economical storage, handling, and transport.

Paper Grade: A paper classification based on characteristics desired for recycling. The co-ordinator of a recovery program decides, with the advice of a paper buyer, what grade or grades will be recovered; however, the presence of contaminants in the grade(s) intended for recovery, may mean that the paper will have a reduced value in the marketplace, i.e. the paper may be "down-graded," or rejected as worthless. One of the following four grades (descriptions of grades vary among buyers) would likely be chosen as the target grade in a school waste paper recovery program:

White Ledger: Printed white bonds.
Manifold Coloured Ledger: Printed white bonds with 10% coloured bonds.
Coloured Ledger: Printed coloured bonds (can include varying % of white bonds).
High-Grade Mixed Paper: Clean assortment of various grades (shall not exceed 5% groundwood content).

In descending order, all paper from the higher grades are acceptable in the lower grades, In ascending order, additional papers listed in the lower grades are "outthrows" in the higher grades. For example, Manifold Coloured Ledger may be the target grade for recovery, but more than 10% coloured papers would cause the Manifold Coloured Ledger to be down-graded by the buyer to Coloured Ledger; furthermore, the presence of some "groundwood"-type papers (low-grade paper) would cause Coloured Ledger to be down-graded to High-Grade Mixed Paper. Each of the four grades listed above includes tab cards and computer printout which may be available in certain schools. These valuable papers may be combined with the target grade, or may be able to be kept separate as higher grades called:

Manilla Tabs: Regular white computer cards.
Coloured Tabs: Regular coloured computer cards.
Manifold White Ledger: Computer printout/lightly printed bond.

Paper Mill: A site at which paper is manufactured from natural wood pulp and/or from natural wood pulp to which recovered waste paper has been added.

Recycling: The process of transforming recovered waste materials into new materials. In the high-grade waste paper recycling process, de-inked waste paper is mixed with water, chemicals, and wood pulp, to form a slurry which is sprayed onto screens, rolled out into new paper, and dried.

Waste: Any material or product that has served its original purpose.

Waste Paper: Any paper or paper product that has served its original purpose.

Waste Paper Broker: A company which, for a fee, arranges sales and purchases of waste paper, but does not handle the paper as does a dealer.

Waste Paper Dealer: A company which purchases waste paper, and sells it to other waste paper buyers, e.g. dealers, brokers, and mills. Dealers generally collect paper from large suppliers, sort it into specific grades, and bale it, for shipment to buyers.

APPENDIX G
Resource List

(Sources of additional information about waste management and recovery)

Publications: There are three main publications which offer information about establishing waste paper recovery programs. None of the three is specifically geared to recovery of ledger from schools, and each would need to be adapted for schools:

- "Guidelines for Implementing an Office Paper Recovery Program" (1978). Available from the Information Services Branch, Ontario Ministry of the Environment, 135 St. Clair Ave. West, 6th Floor, Toronto, Ontario, M4V 1P5. (These "Guidelines" could be useful for designing waste paper recovery programs from school board administration buildings.)
- "Guide for the Recovery of High-Grade Waste Paper from Federal Office Buildings through At-Source Separation," and "Supplement to the Guide" (1978). Available from the Environmental Protection Service—Ontario Region, Environment Canada, 25 St. Clair Ave. East, 7th Floor, Toronto, Ontario, M4T 1M2. (This federal "Guide" could be useful for designing waste paper recovery programs for school board administration buildings. The "Supplement" elaborates on market and technical developments which may be of interest to those who wish to expand their understanding of recovery/recycling issues.)
- "Waste Paper and What to Do About It." Available from the Canadian Pulp and Paper Association, 2300 Sun Life Building, Montreal, Quebec, H3B 2X9. (This short booklet is geared to waste newspaper and corrugated cardboard recovery, rather than waste ledger paper recovery. Its usefulness lies in the brief section on the history of paper recycling, and in several sections which explain why paper mills and dealers prefer to deal with large-volume suppliers.)

Resource Persons (Toronto Area):

- Professor Robert Logan, Department of Physics, and Institute for Environmental Studies, University of Toronto, Toronto, Ontario, M5S 1A1. (Available, schedule permitting, as a guest speaker at student assemblies and meetings held to promote interest in paper recovery programs.)
- Ms. Toni Ellis, Supply Development Co-ordinator, The Is Five Foundation East York Conservation Centre, 1101 Millwood Rd., Toronto, Ontario. (Assists in establishing school waste paper recovery programs, and arranges transportation services

for recovered school waste paper in Toronto's Borough of East York.)

- Ms. Judy Vellend, Community Liaison Co-ordinator, Toronto Recycling Action Committee, City Clerk's Office, Toronto City Hall, Toronto, Ontario, M5H 2N2. (Available as a guest speaker at school meetings held to discuss information and action on waste reduction, reuse, at-source recovery, and recycling.)

Organizations/Departments:

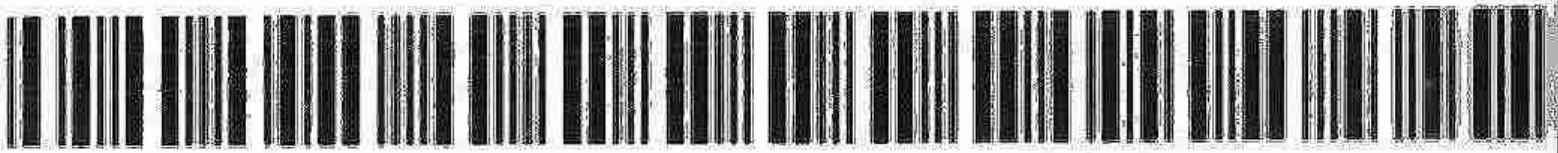
- Information Services Branch, Ontario Ministry of the Environment, 135 St. Clair Ave. West, 6th Floor, Toronto, Ontario, M4V 1P5. (The Educational Resources Section of this Branch provides printed information for educators. Teachers may request "Facts for Environmental Studies: Environment Ontario's Educational Materials, Publication Code ED1," which is a list of general environmental materials. While none of these materials deals specifically with the establishment of waste paper recovery programs in schools, several deal with related education, e.g. "About Waste: Alternatives to Waste Disposal," and "An Education Fact Sheet: Recycle and Save our Resources.")
- The Recycling Council of Ontario (RCO), 477 Dupont St., Toronto, Ontario, M6G 1Y6. (The RCO provides marketing services, transportation arrangements, and information, for its members, many of which operate waste materials recovery programs. The RCO can be useful in the establishment of school paper recovery programs in two ways. First, the RCO will refer an enquirer, who is interested in school waste paper recovery, to an RCO member, if an RCO waste materials recovery program operator is in or near the locality of the enquirer; thus, enquirers can contact local recovery program operators for information about marketing, transportation, and other forms of local co-operation. Second, the RCO will market materials for its members. Although an individual school cannot qualify as a marketing member, a school board could qualify. Brochure available on request.)
- Toronto Recycling Action Committee (TRAC), City Clerk's Office, Toronto City Hall, Toronto, Ontario, M5H 2N2. (This Toronto City Council Committee provides resource kits on waste management to teachers in the City of Toronto. Teachers outside of the City may be interested in the publication entitled, "Some Suggested Activities for the Classroom," from the kit. This single sheet describes waste reduction and reuse projects which would complement a school waste paper recovery program.)

GENERAL:

Many other organizations and departments in Ontario provide information which, although not directly related to school waste paper recovery programs, would supplement recovery programs by providing an educational backdrop on waste management. Some of these information sources* are:

- Canadian Organic Growers, 33 Karnwood Drive, Scarborough, Ontario, M1L 2Z4 (composting information).
- Conservation and Renewable Energy Branch, Department of Energy, Mines, and Resources Canada, Sir William Logan Building, 580 Booth St., Ottawa, Ontario, K1A 0E4 (waste management information; especially good is the "Garbage Book").
- Ecology House, 12 Madison Ave., Toronto, Ontario (a project of the Pollution Probe Foundation; an urban dwelling renovated to demonstrate waste management in action; tours available (on request).
- Is Five Foundation, 477 Dupont St., Toronto, Ontario, M6G 1Y6 (general waste materials recovery information).

* For each source listed, the focus of the organization or department is broader than the waste management activity listed.


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